

3/23/18

"Challenges are what make life interesting and overcoming them is what makes life meaningful."
 -Joshua J. Marine

HW: "Reflecting Parabolas" Homework section #1-5 Ben
 Test 3 is DUE: Wednesday 3/28 do #1-8

AIM: How do we recognize reflections of Parabolas?

Warm Up:

1) What is the vertex of the equation $f(x) = -(x+3)^2 - 32$?

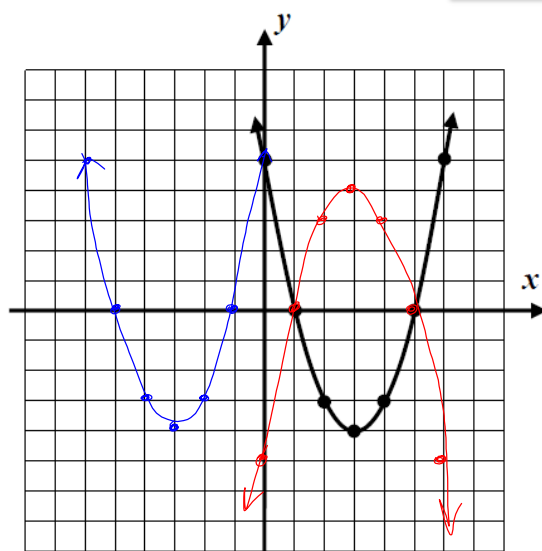
$$\begin{array}{c} (0, 0) \\ -3 \quad -32 \\ \hline (-3, -32) \end{array}$$

vertex of x^2 is $(0, 0)$

left
3 (subtract
3 from x)

Down 32
(subtracting 32
from y)

Exercise #1: The parabola $f(x) = x^2 - 6x + 5$ is shown on the grid below.



- (a) Consider the function $g(x) = -f(x)$. Determine a formula for $g(x)$ and graph it on the grid below.

$$f(x) = x^2 - 6x + 5$$

$$g(x) = -(x^2 - 6x + 5)$$

- (b) How was the graph of f transformed to produce the graph of g ?

reflected over x-axis
(y-values switch signs)

- (c) Now consider the function $h(x) = f(-x)$.

Determine a formula for $h(x)$ and graph it on the grid above.

$$f(x) = x^2 - 6x + 5$$

$$f(-x) = (-x)^2 - 6(-x) + 5$$

$$h(x) = (-x)^2 - 6(-x) + 5$$

$$h(x) = x^2 + 6x + 5$$

- (d) How was the graph of f transformed to produce the graph of h ?

reflection over the y-axis
(x-values changed sign)

REFLECTING FUNCTIONS IN THE x AND y AXES

The function $-f(x)$ is a reflection of $f(x)$ in the x -axis.

The function $f(-x)$ is a reflection of $f(x)$ in the y -axis.

Exercise #2: Determine an equation for the linear function $g(x) = 5x - 7$ both after a reflection in the x -axis and y -axis. Label your equations.

reflect over
 x -axis

$$g(x) = 5x - 7$$

$$y = -(5x - 7)$$

$$y = -5x + 7$$

reflect over
 y -axis

$$g(x) = 5x - 7$$

$$y = 5(-x) - 7$$

$$y = -5x - 7$$

Exercise #3: If a parabola has the equation $f(x) = 2x^2 - 3x + 8$, which of the following represents its equation after a reflection in the x -axis? y -values change (outside)

(1) $y = 2x^2 + 3x + 8$ (3) $y = -2x^2 + 3x + 8$

(2) $y = -2x^2 + 3x - 8$ (4) $y = 2x^2 - 3x - 8$

$$-(2x^2 - 3x + 8)$$

$$-2x^2 + 3x - 8$$

Exercise #4: After a reflection in the y -axis, the quadratic function $g(x) = 4x^2 - 7x + 2$ would have the equation

(1) $y = -4x^2 + 7x + 2$ (3) $y = 4x^2 + 7x + 2$

(2) $y = -4x^2 + 7x - 2$ (4) $y = 4x^2 + 7x - 2$

x -values change (inside)

$$g(-x) = 4(-x)^2 - 7(-x) + 2$$

$$= 4x^2 + 7x + 2$$

Exercise #5: Consider the function $g(x) = -x^2 + 4$. What two transformations have occurred to the graph of $y = x^2$ to produce the graph of g ? Specify the transformations and the order in which they occurred. Note that there exists more than one correct answer. Graph on your calculator to verify.

1) Reflection
over the x -axis
(negative symbol)

2) Shift up 4 units
(+4)

both are outside therefore
they affect y -values.

reflecting
x-axis

$$\begin{array}{r} y = 4x^2 + 7x + 16 \\ \hline -1 \qquad -1 \end{array}$$
$$y = -4x^2 - 7x - 16$$

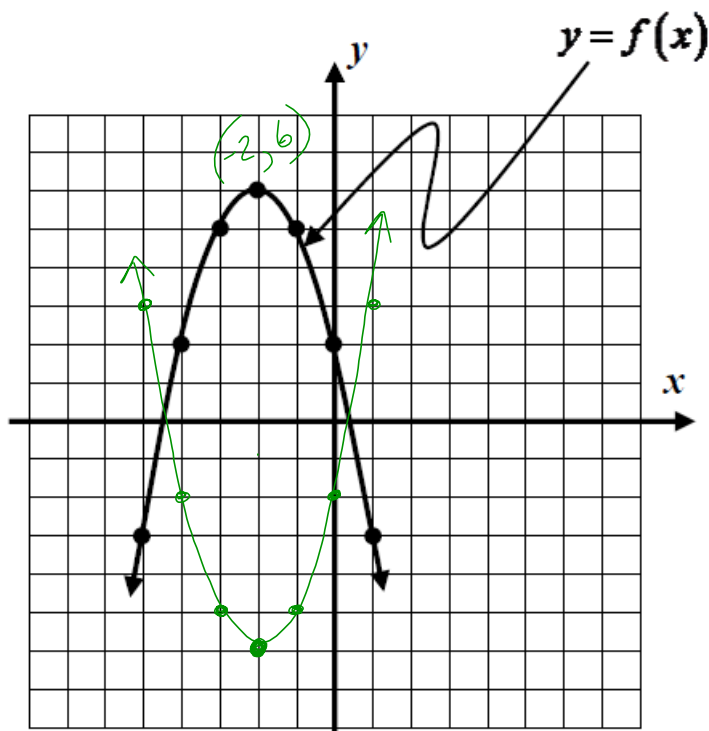
reflect
over
y-axis

$$y = 4x^2 + 7x + 16$$

$$y = 4(-x)^2 + 7(-x) + 16$$

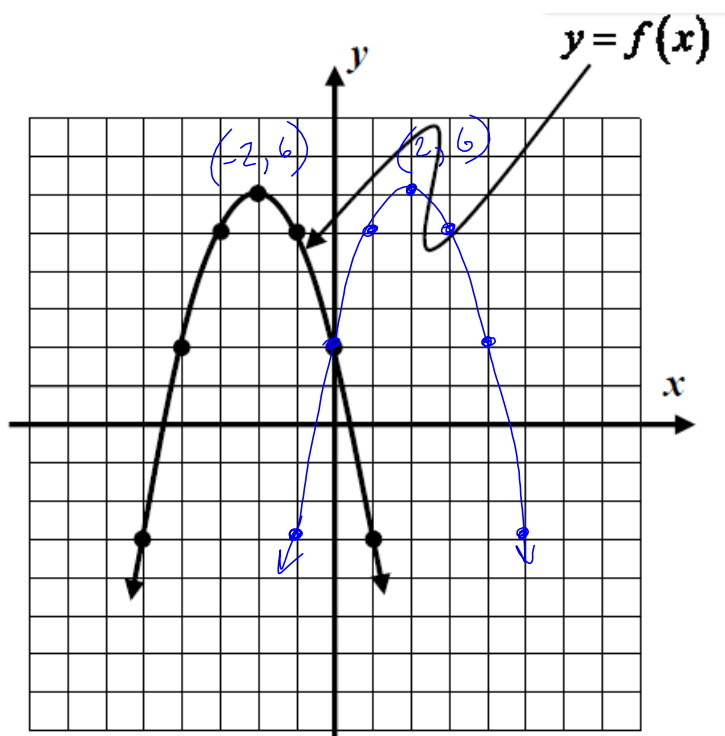
$$y = 4x^2 - 7x + 16$$

Exercise #6: The graph of a function $f(x)$ is shown below on two grids. Sketch (a) the graph of $-f(x)$ and (b) the graph of $f(-x)$.



(a) Graph and label $-f(x)$.

$-y$



(b) Graph and label $f(-x)$